The Gladstone CIRM Shared Human Embryonic Stem Cell Core Laboratory

Grant Award Details

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Grant Type: Shared Labs

Grant Number: CL1-00514-1.1

Investigator:

Name:	Deepak Srivastava
Institution:	Gladstone Institutes, J. David
Type:	PI

Award Value: $842,672

Status: Closed

Grant Application Details

Application Title: CIRM Shared Human Embryonic Stem Cell Core Laboratory

Public Abstract:

The CIRM Shared Human Embryonic Stem Cell Core Laboratory will provide shared research facilities for use by California scientists. This laboratory will be hosted by a research institution focused on basic research into three of the most important medical problems of modern times: cardiovascular disease, AIDS, and neurodegenerative disorders. Each of these research areas addresses promising targets for regenerative medicine. We propose to develop a laboratory (1108 sq ft) for hESC tissue culture with specialized microscopy, and an animal holding and procedure space (500 sq ft) for in vivo pre-clinical studies of hESCs in mouse models of disease. The proposed laboratory will also help to train students from a nearby college be become laboratory technicians. This facility will contain advanced equipment for analyses of hESCs and complement existing space and incorporate hESC work provided by other core laboratories such as the genomics and flow cytometry cores that serve a broad community of researchers.

The host institution is renowned for the quality and administration of its extensive core facilities. Highly productive cores have always been at the heart of this institution's culture and this continues to be a priority. Five years ago, the host institution founded an embryonic stem cell core, which allows investigators not familiar with ESC research to obtain training, expertise and knowledge regarding embryoid bodies and ESC differentiation. As a result, two-thirds of the current investigators have incorporated some aspect of stem cell research in their portfolio. The host institution is also located in close proximity to a major biomedical university, so that all stem cell services are being coordinated to provide the best possible array of services to all stem cell investigators.

The research interests of our investigators that are related to stem cells can be grouped into three areas: cardiovascular development and disease, neurodegeneration and repair, and mechanisms that control the genetic stability of the cells while they divide and develop. This research involves the creation of genetically altered ESCs that require maintenance, expansion, and characterization. To aid in the analysis of the cellular phenotypes, we propose to use advanced high-content microscopy equipment. Several leading laboratories that apply this technology to basic cell biological analysis are close to Gladstone. An important next step will be to examine the behavior, survival, and interactions of hESCs once they have been implanted into mice. Visualization of the cells in live animals will be greatly enhanced by the proposed imagining instrument that will allow us to examine living cells within animals by light signals transmitted from the implanted cells. This program represents a comprehensive basic approach to how stem cells develop into other kinds of cells and will form the foundation for future preclinical studies.

Statement of Benefit to California:	Contribution to the California Economy: A major goal of regenerative medicine is to repair damaged tissue. Our research focuses on developing new methods to differentiate human embryonic stem cells (hESCs) into specific cell types for regeneration of diseased tissues. Our research could benefit the California economy by creating jobs in the biomedical industry by developing new technology. Ultimately, this study could help reduce diseases, including cardiovascular, immune, and neurological diseases. Thereby, we hope to increase the productivity and enhance the quality of life for Californians. The results of our studies will help develop new technology that could contribute to the California biotechnology industry. Our studies will create multiple lines of hESCs that have genetic markers that turn on at specific time points. These cell lines could be valuable for biotechnology companies and researchers who are screening for drug compounds that will cause these developmental changes. Furthermore, we are working closely with California companies to develop new microscopes and analysis software that could be the basis for new product lines or new businesses. If therapies do come to fruition, we anticipate that California medical centers will be leading the way. The most important contribution of this study will be to improve the health of Californians. Diseases that are the target of regenerative medicine are major causes of mortality and morbidity, resulting in billions of dollars in healthcare costs and lost days at work. As we continue our efforts in medical research, we hope to one day unlock the secrets of tissue development and repair. This knowledge will help medical researchers develop beneficial therapies beyond what is currently available and potentially improve the quality of life and life expectancy of patients who suffer from disease.